LAKE SHORE INC.
An Oldenburg Group Company
KINGSFORD, MICHIGAN

SHEET 1 OF 9
DATE October 19, 1994
REVISED April 18, 1995

TP-1073-AR-015
CDRL A010

MODULAR CAUSEWAY FERRY
NOISE LEVEL
TEST PROCEDURE

TP-1073-AR-015

CUSTOMER ATCOM

CUSTOMER JOB NO. N/A

CUSTOMER P.O. NO. DAAK01-93-D0007

HULL NOS. First Article

EQUIPMENT Modular Causeway Ferry

EQUIPMENT NO. E03155

EQUIPMENT SERIAL NOS. P40P-0001, P40P-0002 (Powered Modules)

CUSTOMER NOTIFICATION PRIOR TO TESTING 7 DAYS

ENGINEERING NOTIFICATION PRIOR TO TESTING 14 DAYS

LAKE SHORE SALES ORDER NO. 1073AR

DRAWN [signature] DATE Oct 19, 1994

CHECKED [signature] DATE Oct 19 1994

APPROVED [signature] DATE Oct 19 1994

QUALITY [signature] DATE 10/19/94

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Rev	Date	Appvl	Q.A.	Description
--	10/21/94	WJK		Initial Issue
A	1/30/95	WJK		General editorial changes. Deleted Dwg. E20043 and references thereto. Added recorder's initials space to TR-015.
B	4/17/95	WJK		Revised paragraphs 1.1, 3.1, 5.1 and added 5.2 to incorporate ATCOM comments of 3/21/95
C	5/8/96	WJK	LSI 1 QA 5/8/96	Revised ¶'s 3.4.2 and 3.5 to indicate no GFE or personnel are required

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MODULAR CAUSEWAY FERRY
NOISE LEVEL TEST PROCEDURE

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1.0 INTRODUCTION

1.1 Objective. The objective of the Noise Level Test is to determine the noise levels in the Operator's Cab and at six (6) locations on deck of the Modular Causeway Ferry (MCF) while operating with rated load (350 short tons) at rated speed (6 knots). Testing shall demonstrate that noise levels of the MCF at deck locations do not exceed 85 dB(A) as specified by Mil-Std-1474 Category D.

Testing shall also demonstrate the noise level inside the operator's cab does not exceed 65 dB(A) as specified in MIL-STD-1474, Category F.

1.2 Test Item. The test item, described as the MCF, is defined by Lake Shore drawing E03155 and includes one powered section, two intermediate sections, and one beach/sea end section.

1.3 Test Limitations. Noise Level Testing will be performed in conjunction with Speed Trial Tests, TP-1073-AR-012. Measurement locations and operating conditions are specified in the purchase description, therefore, noise contour testing and duty cycle testing will not be performed.

2.0 REFERENCE DOCUMENTS

2.1	PD 1990-0098	Purchase Description (Para's 4.5.2.7.6, 3.5.7)
2.2	Mil-Std-1474C	Noise Limits for Military Material (Metric)
2.3	E20001	General Test Requirements
2.4	E20011	Failure Reporting, Analysis, and Corrective Action System (FRACAS)

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3.0 TEST PREPARATION

3.1 Approach to Test. The noise levels of the MCF will be determined by measuring and recording the sound pressures in terms of dB(A), dB(C), and 1/3 octave bands (between 63 Hz and 8000 Hz). Noise levels will be measured in the Operator's Cab and at six (6) locations on the deck of the MCF. If the noise levels measured on the dB(A) scale *do not exceed* 85 dB(A) on deck and 65 dB(A) in the operator's cab, it is verified that the MCF meets the specified requirements for noise levels.

3.2 General Test Requirements. Refer to ref. 2.2 and 2.3 for general test requirements.

3.3 Government Notification. ATCOM and the Government Quality Assurance Representative shall be provided with seven (7) days notification prior to the start of testing.

3.4 Personnel Requirements. The following personnel are required for performance of the Noise Level Test:

3.4.1 Contractor furnished personnel: Test supervisor, MCF operators, MCF crew, test equipment technicians.

3.4.2 Government furnished personnel: None

3.5 Facilities and Test Equipment. The following facilities, support equipment, and test equipment are required for performance of the Noise Level Test (CFE = Contractor furnished equipment, GFE = Government/Customer furnished equipment):

	CFE	GFE
3.5.1 One (1) complete MCF, outfitted for duty.	X	
3.5.2 A measured course of known distance.	X	
3.5.3 Noise measurement instrumentation including sound level meters, band filter sets, and acoustic calibrators. Sound level meters shall conform to ANSI S1.4 Type 1. Band filter sets shall conform to ANSI S1.11, Type E, Order II. Sound level calibrators shall conform to ANSI S1.40. Refer to Lake Shore drawing E20043 for instrumentation.	X	
3.5.4 350 short tons of load with rigging for handling the load.	X	
3.5.5 Diesel fuel oil, ASTM D975 Grade 2-D or equal, 800 gallons.	X	
3.5.6 Mooring lines and dockside equipment for mooring the MCF to the pier.	X	

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4.0 TEST PROCEDURE

4.1 Noise Level Testing will be performed in conjunction with the Speed Trial Tests, TP-1073-AR-012. Noise levels will be measured as the MCF traverses the measured course at full load and full speed. Test documentation shall be recorded on the Test Report TR-1073-AR-015.

4.1.1 Only a single set of data is required to be taken.

4.2 Identify all instrumentation used to measure noise levels (including make, model, serial number) and the calibration procedures and data for the instrumentation.

4.2.1 Sound level meters shall conform to ANSI S1.4 Type 1. Band filter sets shall conform to ANSI S1.11, Type E, Order II. Sound level calibrators shall conform to ANSI S1.40. Sound level meters shall be set at Slow Meter Damping.

4.3 Test conditions shall meet the following restrictions.

4.3.1 Ambient noise shall be 75 dB(A) maximum. It is desirable that ambient noise be 10 dB below that of the equipment noise being measured.

4.3.2 Measurements shall not be made with wind velocities of 12 mph or greater. With wind velocities of 6 to 12 mph, a wind screen shall be used.

4.3.3 Noise level testing shall be conducted with a minimum number of test personnel in the testing area.

4.4 For each location and condition identified, an Acoustical Test Data sheet (Mil-Std-1474C Figure 11) shall be completed. Data to be documented includes the following.

4.4.1 Date, time of day, and test location.

4.4.2 Identification of the test item, including model number, serial number, hourmeter reading, and test item condition.

4.4.3 Ambient conditions (temperature and wind) at the time of testing.

4.4.4 A description of the operating conditions, including engine speed and load.

4.5 Noise measurements shall be made in the following locations. For each location, noise shall be measured for ambient conditions (engines off) dB(A) only and for full load operating conditions. (Record ambient readings in "REMARKS" column of MIL-STD-1474, Figure 11 on TR-1073-AR-015.)

4.5.1 Forward on the Beach/Sea End Section, port side, microphone facing aft.

4.5.2 Forward on the Beach/Sea End Section, stbd side, microphone facing aft.

4.5.3 Forward on the Powered Section, port side, microphone facing aft.

4.5.4 Forward on the Powered Section, stbd side, microphone facing aft.

4.5.5 Aft on the Powered Section, port side, microphone facing forward.

4.5.6 Aft on the Powered Section, stbd side, microphone facing forward.

4.5.7 In the Operator's Cab (with the microphone representing the operator's right ear), with the windows closed and the heater and defroster off.

4.5.8 In the Operator's Cab (with the microphone representing the operator's right ear), with the windows open and the heater and defroster off.

4.5.9 In the Operator's Cab (with the microphone representing the operator's right ear), with the windows closed and the heater and defroster on.

5.0 ACCEPTANCE CRITERIA

5.1 Noise level measured on dB(A) scale does not exceed the 85 dB(A) limit on deck.

5.2 Noise level measured on dB(A) scale does not exceed the 65 dB(A) limit in operator's cab.

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MODULAR CAUSEWAY FERRY
NOISE LEVEL TEST

TEST REPORT

TR-1073-AR-015

CUSTOMER ATCOM

CUSTOMER P.O. NO. DAAK01-93-D-0007

EQUIPMENT MODULAR CAUSEWAY FERRY

TEST COMPLETION DATE June 3, 1996 & June 5, 1996

Instrumentation and Calibration Data See attached table of additional readings taken June 5, 1996 during vibration testing. See supplement sheet 9A to this test report. Only dB(A) readings were recorded. Values indicated are typical for all frequencies at each location.

Noise Level Data

Test Data Sheets Attached 3 Acceptable _____ Not Acceptable X By W Keller
Accept 85 dB(A) maximum.

Test Witnessed by:

LSI Rep W Keller 6-11-96 Customer Rep 11 JUN 96 Other _____

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ACOUSTICAL TEST DATA				Time	Date 6-3-96	Sheet
Test Item				Supervisor	Operator	Witness
Model No.	Serial No.	Odometer	Hourmeter	Test Item Condition		
Temperature	Humidity	Test Site		Surface	Terrain	
Baro Pressure	Sky Cover			Stationary Operation ___	Highway Driving ___	Drive By ___
Wind Direction	Wind Velocity	Microphone		Sound Level Meter		Octave Analyzer
Interior ___	Exterior ___	Microphone Location See Below		Recorder		Tape No.

Gear	RPM	Speed	dBA	dBB	dBC	All Pass	31.5	63	125	250	500	1000	2000	4000	8000	REMARKS
			~~62~~				FWD - Beach/Sea End Section (Port)									Ambient Condition dB(A)
			67 TO 70													57 TO 65
							FWD - Beach/Sea End Section (STBD)									Ambient Condition dB(A)
			67 TO 70													57 TO 65
							FWD - Powered Section (Port)									Ambient Condition dB(A)
			65 TO 69													57 TO 65
							FWD - Powered Section (STBD)									Ambient Condition dB(A)
			90 TO 91													57 TO 65
							AFT - Powered Section (Port)									Ambient Condition dB(A)
			86													57 TO 65
							AFT - Powered Section (STBD)									Ambient Condition dB(A)
			86/87													57 TO 65

Mil-Std-1474C Fig 11

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ACOUSTICAL TEST DATA				Time	Date	Sheet
Test Item				Supervisor	Operator	Witness
Model No.	Serial No.	Odometer	Hourmeter	Test Item Condition		
Temperature	Humidity	Test Site		Surface	Terrain	
Baro Pressure	Sky Cover			Stationary Operation ___ Highway Driving ___ Drive By ___		
Wind Direction	Wind Velocity	Microphone		Sound Level Meter	Octave Analyzer	
Interior ___ Exterior ___		Microphone Location See Below		Recorder		Tape No.

Gear	RPM	Speed	dBA	dBB	dBC	All Pass	31.5	63	125	250	500	1000	2000	4000	8000	REMARKS
							OPER. CAB / Windows Closed; Heater, Defroster - Off									Ambient Condition dB(A)
			84													57 TO 65
							OPER. CAB / Windows Open; Heater, Defroster - Off									Ambient Condition dB(A)
			91													57 TO 65
							OPER. CAB / Windows Closed; Heater, Defroster - On									Ambient Condition dB(A)
			85/86													57 TO 65

Mil-Std-1474C Fig 11

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MODULAR CAUSEWAY FERRY

SUPPLEMENTAL NOISE READINGS TAKEN JUNE 6, 1996

ENGINE RPM	NOISE dB(A)			
	STBD FWD	STBD AFT	PORT FWD	PORT AFT
875	78.5	---	79	---
950	80	75.5	81	74.5
1025	82.5	78	82.5	79
1100	83	78.5	83	79.5
1175	81	79	83.5	79.5
1250	83	79	83.5	79
1325	84.5	80	83.5	82.5
1400	83	81.5	84.5	82
1475	83.5	80.5	84.5	82.5
1550	85.5	83.5	84.5	83.5
1625	86.5	84.5	84.5	83.5
1700	88	83.5	86	84
1775	90	86.5	86	85
1850	89	86.5	89.5	85
1925	88.5	87.5		85
2000	88.5	86	88.5	85.5
2075	91	86	91	86
2150	89.5	86.5	92	86
2200	90	87	92	87.5

All above readings dB(A).

In addition, at 2000 engine RPM readings of 96.5 dB(A) were recorded at locations 5' forward of each inlet plenum port and starboard.